Classes of Sensory Classification:

A commentary on Mohan Matthen, *Seeing, Doing, and Knowing* (Oxford: Clarendon Press, 2005)

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Sensory classification is a central theme of Mohan Matthen's wonderful book, *Seeing, Doing, and Knowing*.[1] My plan for this commentary is simple: I shall list a series of claims that Matthen makes about the classes involved in sensory classification. Each member of the series is admirable, and seems credible on its own. The question at the end is whether we can hold them all, together.

I. The list

1. Sameness in appearance. The book starts with the section "Sensory Classification", and part 1.a. of the "Sensory Classification Thesis" reads:

> Sensory systems classify and categorize: they sort and assign distal stimuli (i.e. external sense objects) to classes. (13)

It is very clear that, at least in the early parts of the book, these "classes" are classes of equivalent *appearance.* Matthen says as much in

> **The Classificatory Equivalence Thesis**: Two stimuli present the same appearance in some respect if and only if they have been assigned to the same sensory class. (31)

"The stimuli that are co-classified *appear* the same in some sensory respect" (23). He also calls the appearances "sense features", defined as:

> a property a stimulus appears to have by virtue of an act of sensory classification ... (14)

The upshot is that when one is aware of two things looking the same, one is aware of one of the byproducts of sensory classification. "Classificatory sameness and difference are expressed as phenomenal sameness and difference" (90)

Here is an example. If you look about your surroundings, you might notice patches of variously different colors and textures. Some patches look the same color; others differ, to greater or lesser degrees. Pick two that look the same. According to Matthen, in sensory processing there were "acts of classification" in which those two patches were both assigned to the same class. They were categorized as members of class kappa. So matching patches in the visual field betoken assignment to the same class.

2. Disunity of color. The notion that sensory classifications are system-generated becomes particularly potent when allied with the recognition that systems found in different species do this classifying differently. Matthen's account improves on his earlier "Disunity of Color" (1999). He says:

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1 All page references are to Matthen 2005 unless otherwise indicated.

> we must accord to pigeon colors exactly the same authority as we have just ceded to the colors that humans experience. This need not violate logic. Properties--even physically specifiable properties--are infinitely numerous... Why then can both not be correct? (Matthen 2005, 202)

The answer might seem obvious: pigeons and humans disagree about the similarities and differences of the colors. This answer presumes that both species represent the same properties, and disagree about some of their attributes. It is precisely this assumption that Matthen denies. Even though we call both sensory capacities "color vision", perhaps the only similarity between them is that they both make discriminations of wavelength independently of luminance. Different species can meet this condition even though they "might be converging on different properties of distal stimuli" when they use those capacities (202). They both have "color vision" (in this broad sense); but the sensory systems that instantiate color vision in the two species can have distinct functions and distinct correctness conditions. This I think is the deeper meaning of the

> ***Disunity of Colour Thesis***. I. There is no ecologically characterized class of properties such that colour vision must consist (in whatsoever kind of organism it may occur) in the capture of some or all of the members of this class. II. There is no subjectively characterized class of properties such that colour vision *must* consist (in whatsoever kind of organism it may occur) in the capture of some or all of the members of this class. (154).

Many versions of color realism address themselves to the question: What is the real nature of color? Matthen's response, in effect, is: Why would you think that there is just one? The real nature of pigeon colors can be distinct from that of Old World monkey colors

3. Correspondence realism. Despite this departure from some extant versions of color realism, Matthen thinks that his view is a kind of realism. He calls it "Pluralistic realism". The thesis is that "each organism fastens by means of its sensory systems on objective features of the environment in which it has a particular interest" (92).

The crux lies in detailing what it is for these features of be "objective" features. If they are real they "correspond" to "system independent properties" (141). "System-independent" in turn gets slightly different interpretations in different places. These are properties that "can be specified in a system-independent way" (141); properties that "possess external significance and validity" (188); or properties that exist outside (142), in the external world (198), or "independently of" perception (191). An irrealist, he says, is one who thinks that chromatic classifications cannot be "associated with" any properties that "exist independently of perception" (191). Since "even idiosyncratic sensory categories can possess external significance and validity" (188), we get a kind of realism that is consistent with disunity.

4. Specialized functions. This position faces the burden of explaining how it is that, despite their differences, both pigeon vision and Old World monkey vision are instances of *color* vision. Matthen's answer is that both use a capacity to detect wavelength differences independently of luminance, even though that capacity has different specialized functions in the two species.

> An adequate answer to this puzzle depends on a proper understanding of specialized functions. Most perceptual categories are put to some use with regard to our functioning in the external world. Now, the utility of a perceptual category may be disrupted if the organism fails to respond to its customary delineation... (205)

In fact for Matthen these uses are "associated by evolution" with the category in question (233). He assumes that "most species are in evolutionary equilibrium most of the time" (206), and argues that therefore "for most species now there is no mismatch between sensory capacities and innate sensorily guided activities" (206). We have a set of actions "associated by evolution" with the development of that capacity. These constitute what he calls "innate sensorily guided activities", "species activities", or "specialized functions". They are "innate" in the sense that they are either "genetically or developmentally specified" (205).

5. Correctness conditions. If we can pick out those actions, then we can derive the sort of correspondence needed if acts of classification are to be correct. "An act of classification is wrong if it disrupts a specialized function that this act of classification is supposed to aid" (206). Not all sensory states have a content (if they fail to serve a specialized function, then they do not); but if they do, their "Primary Sensory Content" is, always,

> that the situation is right for a certain action or actions, these actions having been associated with this state by evolution. These actions may include epistemic actions. (233)

For example, perhaps the red-green opponent system evolved in Old World monkeys to aid detection and picking of the sorts of fruits that Old World monkeys eat (see Mollon 1991). One kind of mango is ripe when it is reddish orange; so awareness that a mango is reddish orange signals that the situation is right for picking. An unripe mango that looks reddish orange violates correctness conditions: it merely looks reddish orange, but is not (see 264-5, 208).

Let us sum up the series so far. The sensory system classifies stimulus sigma in class kappa. As a result, sigma looks a certain way, and that look is a label for kappa. Being aware of the look of sigma is being aware of a message that the sensory system posts: that sigma is in kappa. There are various innate activities enabled by the ability to register membership in the class; messages to that effect help to guide the organism in the successful performance of those actions. If, proceeding on that guidance, the subsequent actions are disrupted, or fail, then the classification is incorrect. Otherwise, the actions succeed, the situation is therefore right for those actions, and so the classification is correct.

6. Physical specification. This fifth member seems to conflict with the third. Why should we think that classifications that serve the specialized, action-guiding needs of a particular species correspond to properties that can be specified without mentioning that species at all? Matthen wants to embrace both these claims. He calls the result

> ***Action-Relative Realism****:* Sense experience *E* (or neural state *N*) represents distal feature *F* in the action-relative sense for a member of species *S* if (a) *F* is the physically specifiable response condition of *E* (or N) and (b) misclassifying things as F disrupts some innately or developmentally specified use to which E (or N) is put by members of species S. (206)

Condition (a) is needed to keep correspondence realism alive. By "physically specifiable" he means that the extension of that class can be described in the language of physics (199). Such extensions are not limited to fundamental physical magnitudes, named in the laws of physics. Instead all we need is some way of delimiting that class, using any and all of the resources of that language. The example he gives is of a differencing operation on the outputs of (L+S)-M ((long + short) - middle) wavelength receptors in the retina. The power to inhibit my (L+S)-M opponent process system to degree delta is "physically specifiable" (142) even though clearly it is not a fundamental physical magnitude. He says:

> it is always possible to describe what a sensory system detects in physical terms; i.e. it is always possible physically to specify the response conditions of its various states.. (199; see also 204, 213)

At this post the docile steed may balk. Can we *always* do this?

II. Problems with the list

I fear the notion of "physical specifiability" shifts in the course of the argument, in two ways. The members of the sensory class to be specified shift from proximal stimuli to distal stimuli. The copula shifts from *looks P* to *is P*. Both have a big effect on the plausibility of supposing that the classes involved in sensory classification can always be "physically specified".

Remember where we started. In the beginning, the classes are classes of equivalent appearance. A sense feature is a property a stimulus *appears* to have (14). Two stimuli present the same appearance in some respect if and only if they have been assigned to the same sensory class (31). Likewise, "physical specification" starts firmly grounded in the psychophysics of receptors: a differencing operation on their results. The stimuli involved are proximal--bundles of photons entering the eye. One might have a second stimulus with all the same properties as the first one--the same numbers of photons, at the same wavelengths--but those are different photons, and it is a different occasion. It is a numerically distinct stimulus.

But notice how far we have moved by the time we get to action-relative correctness conditions. There the target is a fruit, which is usually unripe, but sometimes ripe. That target looks reddish orange sometimes, but yellowy green other times. In our crosshairs we need a persisting physical object, whose conditions and appearances can change over time.

If a proximal stimulus is an occasion, then when we name a proximal stimulus, we thereby implicitly fix values for other viewing-condition variables that dramatically affect color appearance. The observer is the observer on whose retina those photons impinged, whose cone populations and densities are like *so*. The state of adaptation is the state of adaptation of the visual system in question. The illumination is the illumination current at that time. Same for the colors of the surround; the size of the visual angle; and its position relative to the fixation point.

If all those are given, then one can indeed frame a "physical specification" of the different bundles of photons that would be treated more or less equivalently, at that moment, by that visual system. But it is an entirely different proposition if the "stimulus" to be targeted is an enduring physical object. That target requires us to generalize over multiple occasions. The same object can reflect different bundles of photons, under different viewing conditions, into many different retinas. There is no known way to determine whether this bundle of photons, reflected off of that object, presented under these conditions, to this retina, will look the same as that bundle of photons, produced under different conditions, and presented to a different retina. Color science cannot do it. Even if we had a "physical specification" of *all* the physical properties of two objects we still could not predict whether they will *look* the same. They might match when viewed in light from the northern sky, but not when in direct sunlight. Hold that variable constant. Still, even among normal observers, they will match for some observers, but not others. So, hold that variable constant too. Still, they might match if viewed in a two degree field of view, but not if they fill ten degrees. And so on.

Action-relative correctness conditions are required to apply not just to occasions of proximal stimuli that look yellow or that look reddish-orange, but rather to enduring physical objects that *are* yellow, or that *are* reddish-orange. The copula changes, from *looks P* to *is P*. If this is right, it is very bad news, for the resources to do that job also cannot be found anywhere in color science. If *P* is a color term, color science seems everywhere to stop at verdicts of the form "*looks P*". No collection of those can ever get us to verdicts of the form "*is P*". More is needed, and I do not know any place in color science that can provide it.

Larry Hardin (1988, 91 ff.) dubbed this the problem of "chromatic democracy": the same object can present appearances of many different colors on different occasions, and there is no scientifically respectable way of selecting some subset of those appearances as the veridical ones. At least, there is no way if the science in question is confined to color science. Perhaps the idea is that those correctness conditions require appeal to parts of science other than color science. To get to the ripeness of the fruit that makes the appearance of reddish-orange veridical, we appeal to biochemical and physiological specifications of the sugars and starches in a fruit, their digestibility in a particular fructivore, etc. Perhaps that would give a "physical specification". It seems somehow a desperate course; at the very least we cannot simply *assume* that it will succeed.

So, here is the worry in a nutshell. Color science can provide physical specifications of *proximal* stimuli that, in controlled conditions, *appear* the same to a particular observer. The action-relative correctness conditions at the end of the list require physical specifications of classes of *persisting* physical objects that *are* a particular color. I do not know anyone who can provide those. And if the members at the end of the list are not physically specifiable, we may lose our warrant for saying the result is a kind of realism.

References

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